A block is pushed upward along a frictionless inclined plane.

Determine the force $F$ on the block which causes it to be moving upward with a constant velocity.

A) $F = mg \sin \theta$

B) $F = mg \cos \theta$

C) $F = mg \tan \theta$

D) $F = mg \cot \theta$
If the velocity is constant, there is no acceleration, thus no net force.

$$\sum F_x : \quad F - N \sin \theta = 0 \quad \Rightarrow \quad F = N \sin \theta$$

$$\sum F_y : \quad N \cos \theta - M g = 0 \quad \Rightarrow \quad N = \frac{M g}{\cos \theta},$$

so $F = m g \tan \theta$.

Answer C.

05.07-12 Pushing Up the Incline 2004-3-24